BRADY et al
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Appendix to Petition to Make Special

Statement Re Diagnosis and Treatment of Cancer

The example embodiments of subject patent application relate to correcting imaging sequences for movement of the body being imaged. When imaging a patient, for example by magnetic resonance imaging, the patient will move. Such movement could come from breathing, the beating of the heart, and involuntary or voluntary muscle movements. This is a particular problem with magnetic resonance imaging of the human breast. With the imaging arrangement illustrated in Figure 2 of the drawings it can be seen that the breasts hang pendulously inside the coil and thus have a great tendency to move. With contrast enhanced magnetic resonance imaging a contrast agent is injected into the patient and the image scans (actually sixteen of them) can be taken every minute for a approximately seven minutes to monitor the takeup of the contrast agent. It is practically impossible for a patient to remain motionless during that time. The sequence of images which results, therefore, is likely to be corrupted by movement. Given that the sequence of images consists of successive slices, movement between them makes it very difficult to distinguish changes caused by takeup and flush-out of contrast agent and changes caused by movement. Further, because the breast is composed of soft tissue, there are no convenient "fixed" points that can be identified to make motion compensation straightforward. This is exacerbated by the fact that as contrast agent is taken up, various image features change their intensity from frame to frame.

The application describes illustrative systems and methods that can, for example, improve the way in which motion is detected and calculated for non-rigid structures, and thus allows the images to be motion-compensated. This allows the position and presence of structures which are taking up contrast agent to be identified and located with more accuracy. A structure of interest would be a breast tumor.

It will be appreciated from the disclosure of the application that the example systems and methods may be applied to mammography, for the detection and monitoring of breast cancer. Thus in allowing clinicians more easily to compare images in a sequence without the confusing effects of motion, it improves the clinician's ability to locate tumors and thus diagnose cancer, and it also allows a more accurate estimation of changes in tumor size which is of great assistance in assessing the success of treatment regimes.